CLAIMS

1. A method of glucose level control, comprising:

providing at least one electrode adapted to apply an electric field to a pancreas; and

applying an electric field to the pancreas using said at least one electrode such that blood glucose levels are significantly reduced and blood insulin levels are not significantly increased compared to a regular insulin response in a same person.

2. A method according to claim 1, comprising subsequently applying a second electric field to said pancreas, which second field increases insulin levels.

3. A method according to claim 1, wherein said electric field is operative to reduce glucagon secretion.

4. A method according to claim 1, wherein said electric field is operative to reduce glucose secretion by a liver physiologically coupled to said pancreas.

5. A method according to claim 1, wherein said electric field is operative to increase glucose uptake by cells in a body containing said pancreas.

6. A method according to claim 1, wherein said electric field is operative to affect nervous tissue in said pancreas.

7. A method according to claim 1, wherein said electric field is non-excitatory in that it does not substantially induce new bursts of islet activity in said pancreas.

8. A method according to claim 1, wherein said electric field is applied as a bi-phasic and charge balanced time varying field.

9. A method according to claim 8, wherein said electric field is applied for a short duration every period of time.

10. A method according to claim 9, wherein said period of time gives an application frequency of between 1Hz and 15 Hz.

11. A method according to claim 9, wherein said period of time gives an application frequency of about 5 Hz.

12. A method according to claim 9, wherein said duration is less than 30 ms.

13. A method according to claim 9, wherein said duration is about 10 ms.

14. A method according to claim 1, wherein said electric field is repeated for a period of less than 30 minutes.

15. A method according to claim 1, wherein said electric field is repeated for a period of between 30 and 180 minutes.

16. A method according to claim 1, wherein said electric field is applied for substantially all of a duration of a glucose absorption event.

17. A method according to claim 1, wherein said electric field is applied prior to an expected glucose ingestion event.

18. A method according to claim 1, comprising triggering said electric field by a glucose ingestion event.

19. A method according to claim 1, wherein said electric field is applied irrespectively of an ingestion event.

20. A method according to claim 1, wherein said electric field is applied at least part of the time irrespective of a blood glucose level.

21. A method according to claim 1, wherein said electric field is applied continuously for at least 24 hours.

22. A method according to claim 1, wherein said electric field is applied for a period of at least 15 minutes without sensing of its effect.

23. A method according to claim 1, wherein said electric field is of a magnitude and temporal extent so that it does not significantly change blood insulin and glucose levels in the absence of an ingestion event.

24. A method according to claim 1, wherein said electric field reduces blood glucose levels by at least 20% of an elevation of the glucose level above a fasting baseline glucose level.

25. A method according to claim 1, wherein said electric field does not increase blood insulin levels, as measured by an average over five minutes, by more than 20%.

26. A method according to claim 1, wherein said electric field reduces blood insulin levels, as measured by an accumulated amount for a glucose ingestion event and in comparison to a regular response of said person, by more than 20%.

27. A method according to claim 1, comprising, delaying a gastric emptying by applying a treatment to the stomach.

28. A method according to claim 1, wherein said electric field is operative to delay a glucose peak at least by a duration of its application.

29. A method according to claim 1, wherein said electric field is operative to delay a glucose peak at least by 10 minutes.

30. A method according to claim 1, wherein said electric field is operative to delay an insulin peak at least by 10 minutes.

31. A method according to claim 1, wherein said electric field is operative to truncate an insulin peak.

32. A method according to claim 1, wherein said electric field is operative to truncate a glucose peak.

33. A method according to claim 1, wherein said electrode is not attached to a pancreas.

34. A method according to claim 1, wherein said electrode is attached to a pancreas.

35. A method of glucose level control, comprising:

providing at least one electrode adapted to apply an electric field to a pancreas; and

applying an electric field to the pancreas operative to reduce blood glucose levels if elevated and not significantly reduce such levels in an acute manner if not substantially elevated.

36. A method according to claim 35, wherein said electric field reduces elevated glucose levels by at least 20%.

37. A method according to claim 35, wherein said electric field does not acutely reduce unelevated glucose levels by more than 10%

38. A method according to claim 35, wherein said electric field does not impair exocrine functions of said pancreas.

39. Apparatus for blood glucose control, comprising:

at least one electrode adapted to apply an electric field to a pancreas; and

circuitry adapted to electrify said at least one electrode and configured to electrify said electrode with a non-excitatory field in a manner which compensates for a loss of acute response by said pancreas.

40. Apparatus according to claim 39, wherein said circuitry compensates by causing the secretion of an insulin bolus.

41. Apparatus according to claim 39, wherein said circuitry compensates by reducing glucose levels in a non-insulin manner.

42. Apparatus according to claim 41, wherein said circuitry compensates by reducing glucagon secretion.

43. Apparatus according to claim 39, wherein said circuitry reduces or prevents a substantial increase in insulin secretion during said compensation.

44. Apparatus according to claim 39, wherein for at least 20% of ingestion events said circuitry applies only an acute control of insulin levels.

45. Apparatus according to claim 44, wherein said apparatus is programmed with a knowledge of a slow acting chemical-based insulin therapy provided to said pancreas.

46. Apparatus according to claim 39, comprising an automatic ingestion sensor for automatically detecting an ingestion event.

47. Apparatus according to claim 39, comprising an automatic glucose sensor for automatically detecting a situation requiring an acute response.

48. Apparatus according to claim 39, comprising an automatic glucose sensor for automatically detecting a situation requiring an acute insulin response.

49. Apparatus according to claim 39, wherein said response is an acute insulin response.

50. Apparatus according to claim 39, wherein said electrode is adapted for attachment to a pancreas.

51. Apparatus according to claim 39, wherein said electrode is adapted for attachment to a muscular organ.

52. Apparatus for blood glucose control, comprising:

at least one electrode adapted to apply an electric field to a pancreas; and

circuitry adapted to electrify said at least one electrode and configured to electrify said electrode in a manner which significantly reduces elevated blood glucose levels, said circuitry configured to apply said field also when glucose levels are not elevated.

53. Apparatus according to claim 52, wherein said circuitry is a closed loop system including sensing of the effect of the electrification and wherein said circuitry is configured to over stimulate in cases of doubt.

54. Apparatus according to claim 52, wherein said circuitry is a semi-open loop system where a relatively long stimulation series is applied without feedback.

55. Apparatus according to claim 52, wherein said circuitry is an open loop system where a stimulation series is applied responsive to a trigger and without feedback.

56. Apparatus for blood glucose control, comprising:

at least electrode adapted to apply an electric field to pancreatic tissue; and

circuitry adapted to electrify said at least one electrode and configured to electrify said electrode in a manner which reduces glucose levels and does not substantially elevate insulin levels above a baseline value, when glucose levels are elevated.

57. Apparatus according to claim 56, wherein said circuitry is a closed loop system including sensing of the effect of the electrification and wherein said circuitry is configured to over stimulate in cases of doubt.

58. Apparatus according to claim 56, wherein said circuitry is a semi-open loop system where a relatively long stimulation series is applied without feedback.

59. Apparatus according to claim 56, wherein said circuitry is an open loop system where a stimulation series is applied responsive to a trigger and without feedback.

60. Apparatus according to claim 56, wherein said circuitry applies a constant voltage field.

61. Apparatus according to claim 56, wherein said circuitry applies a constant current field.

62. Apparatus according to claim 56, wherein said pancreatic tissue comprises an in-vivo pancreas.

63. Apparatus according to claim 56, wherein said pancreatic tissue comprises a pancreatic tissue implant.

64. Apparatus according to claim 56, wherein said baseline is a baseline insulin response of a person for which the apparatus is used.

65. A method of insulin level control, comprising:

providing at least one electrode adapted to apply an electric field to a pancreas; and

applying an electric field to the pancreas using said at least one electrode such that blood glucose levels are not significantly increased and blood insulin levels are significantly reduced.

66. A method of applying an electric field to a pancreas or functionally and positionally associated tissue, comprising:

attaching at least one electrode to a tissue other than said pancreas; and

electrifying said electrode such that a significant field is applied to said pancreas or associated tissue to control at least one of a level of a pancreas secretion and a blood glucose level.

67. A method according to claim 66, comprising using said at least one electrode to also control eating habits.